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AMERICAN STATISTICAL ASSOCIATION

NEW SERIES, No. 117.

JUNE, 1917.

THE UTILIZATION OF STATISTICS IN BUSINESS.*

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INTRODUCTORY.

Let me preface this paper with a brief quotation from Westergaard's treatise on "Scope and Method of Statistics," which appeared in the QUARTERLY PUBLICATIONS of this Association last June. "A prominent feature of modern statistics is the immense development of the field. . . . In the future the difficulty will be not so much in gathering material as in mastering it, in digesting all these masses of reports which have been stored in the archives and on the book-shelves of statistical offices."

In the future the difficulty will be not so much in *gathering* material as in *mastering* and *digesting* it. These words strike a definite keynote in regard to the modern problem of statistics. A good digestive apparatus thoroughly utilizes the material offered to it, discarding what is unnecessary or ill-adapted and reconstructing what is useful into the form best suited to the general organism of which it is a function. Similarly, the statistician of today must utilize the material at his disposal first by discarding the useless, the irrelevant, and the defective, and then by rearranging the remainder into the form and substance best suited to the needs of the organization with which his interests are bound up.

Statistics are now collected and compiled on every conceivable subject under the broad heavens. This activity is carried

* Paper presented at the annual meeting of the American Statistical Association, Columbus, Ohio December 28, 1916.

on in large part by means of governmental, but in part also by private or voluntary organizations. The principal problem of today is to utilize the great mass of material already available, together with what is constantly being added, so as to make it of the greatest service to society.

Restricting ourselves to the question of statistics as utilized in the modern business world, we may ask: First, what organizations collect statistics of interest to business; Second, what use is actually made of statistics in business practice.

By "business" I mean in a general way all forms of effort put forth by modern society primarily and directly for economic gain. This definition excludes such activities as are devoted to general informational, political, educational, and scientific purposes, even though many of these activities may be, and some undoubtedly are, of indirect service to business. In other words, I shall confine myself strictly to the direct and conscious efforts of the business world to secure and utilize statistical information for its own economic and financial benefit. Even thus restricted, the field presents a much greater extent than could possibly be covered within the limits of a brief paper, and I shall attempt little more than to indicate the several lines along which development seems to be tending most rapidly today.

ORGANIZATIONS THAT COLLECT BUSINESS STATISTICS.

It is clear that the primary sources of information of service to the business world are those afforded by governmental agencies; in especial, the agencies of the federal government. Without going into detail, it may be said that the Departments of Commerce, Agriculture, and the Treasury, and the Interstate Commerce Commission, are the principal federal agencies compiling business statistics, although we must not overlook the Department of Labor, various independent boards such as the Federal Reserve Board, Federal Trade Commission, Farm Loan Board, the newly created shipping and tariff boards, and the like. My effort here, however, is to indicate the compilation activities of private rather than of governmental or public agencies. The number of private agencies is legion, and can be discussed briefly only by general grouping.

First, we have organizations maintained individually or cooperatively by industrial corporations, whose investigations and compilations are designed to cover the whole of the industry in which the particular corporations are engaged. Perhaps the oldest of such organizations now in existence is the American Iron and Steel Institute, which was established in 1855, under a slightly different name, and has published statistical reports of the iron and steel industry ever since. One clause of the constitution adopted in 1855 read as follows: "The general objects of this association shall be to procure regularly the statistics of the trade both at home and abroad." This clause was retained in the constitution when the American Iron and Steel Institute replaced the older association, and may be found there today. In pursuance of this constitutional provision for the collection of statistics of the industry, the secretary of the association compiled in 1859 a guide to the "iron works and iron ore mines of the United States." This was the only available compilation of data regarding American furnaces, rolling mills, forges, and steel works until 1879, when the association published the first edition of its directory to the iron and steel works of the United States, which has been reissued from time to time, down to the present year. The American Iron and Steel Institute in 1913 established a statistical bureau, which issues annual statistical reports covering the production, imports and exports, and prices of iron and steel, iron ore, coal and coke. In addition, the bureau issues bulletins from time to time giving current statistics of production of pig iron, steel ingots and castings, steel rails, nails, pipe, plates, etc.

I have described the statistical work of the Iron and Steel Institute in some detail, both because it is probably the oldest existing organization of the kind, and because it covers the field represented by its industry in an unusually complete and satisfactory manner. Cooperative statistical bureaus or organizations of some kind are maintained in a number of other industries, besides that of iron and steel manufacture. The form, organization, and title of these bureaus vary considerably from industry to industry, but they have this one feature in common: they collect and compile statistics dealing

with their respective industries. Such bureaus or offices exist in the electric railway industry; among life insurance corporations; and in the steam railway industry. In addition, a number of national associations representing particular industries have among their aims the collection and dissemination of statistical data regarding their respective activities. In especial, I would mention the American Forestry Association, which compiles forest statistics; the United States Brewers' Association, which publishes a yearly handbook on the status of the trade; the American Foundrymen's Association, organized in part to collect all proper information connected with the foundry business; the American Mining Congress, which strives to disseminate information in relation to mining, metallurgy, and allied industries; the Copper Producers' Association, which compiles copper statistics; the American Water Works Association, the National Association of Cotton Manufacturers' which collects and imparts information relating to the cotton industry; the Street Railway Association of the State of New York, organized for the acquisition and dissemination of experimental, statistical, and scientific knowledge relating to the construction, equipment, and operation of street railways.

Among the statistical offices created by and among the steam railways are two committees of the American Railway Association, one on relations between railroads and the other on accident statistics. The first of these committees was created in 1907 and has been publishing statistics of freight car surpluses and shortages ever since that date; also, a part of the time, statistics of freight car performance. The other committee was created in 1915 for the purpose of making suggestions for the improvement of the methods of reporting and compiling statistics of railway accidents. Other statistical bureaus organized by the railways have been the Special Committee on the Relation of Railway Operations to Legislation, which has been in existence since 1909 and publishes statistics of laws introduced and passed by state legislatures each year relating to railway operations; the Bureau of Railway News and Statistics, maintained in Chicago by a group of railways, which has been in existence since 1904 and which

compiles annually and periodically statistics of various aspects of the railway question; the Bureau of Railway Economics, organized at Washington in 1910 by railways of the United States, whose work is largely statistical, consisting of various publications on railway revenues and expenses, traffic, stockholders, comparative railway statistics of the United States and foreign countries, wages, equipment, etc. This bureau also compiles statistical exhibits for rate cases, wage arbitrations, and the like, and prepares statistical material on various topics as the result of special inquiries.

A number of large cooperative bodies of business men also maintain organizations for the compilation and collection, or in some cases the improvement, of business statistics. In this class is the Committee on Statistics and Standards of the Chamber of Commerce of the United States recently created. This national federation of local bodies of business men—the United States Chamber of Commerce—was organized in April, 1912. Among other functions it utilizes the commercial data gathered by government bureaus by directing it into the channels to which it is immediately applicable, and analyzes statistics with regard to the production and distribution of manufactures at home and abroad. In other words, the chamber digests and adapts existing business information to the needs of the business bodies constituent to it.

In the second place, we have statistical organizations established and maintained by individual corporations. There are so many of these that I can allude only briefly to a few, which may be regarded as representative of the general situation. First of all may be mentioned the statistical organizations of various brokerage and financial firms, including the larger banks of the country. An excellent example of statistical organizations maintained by banks is that of the National City Bank of New York. The statistical work of that bank consists primarily of the preparation of statistical statements in response to calls from officers of the bank regarding commercial, financial, and industrial conditions in the United States and all other sections of the world. In addition, there is prepared each week a statistical analysis

of the import and export trade of the port of New York. While these statements are prepared primarily for the officers of the bank, they are also supplied freely, in the interest of foreign commerce, to any one making application for them.

Other large banks have statistical departments, as do nearly all of the important banking and brokerage houses in the large cities. Speaking generally, these statistical departments keep track of occurrences and possibilities in the industrial and financial field, and present their findings in general or special reports.

Many manufacturing and industrial firms have departments that compile statistical information along their particular lines. Among organizations which have done this are banks; brokerage and banking houses; local boards of trade, chambers of commerce, stock and produce exchanges, etc.; life and fire insurance companies; telegraph and telephone companies; makers of tires and tire fabrics; locomotive manufacturers; mercantile establishments purveying various lines of goods; construction companies; makers of bank note paper; hardware and brass manufacturers; gas, electric light, heat, and power companies; cotton and silk manufacturers; street and interurban railways; pottery makers; manufacturers of farm implements; tobacco manufacturers; makers of storage batteries and general electric equipment; research laboratories; manufacturers of soda ash; munitions makers; paper pulp makers; taxicab companies. This is only a partial list, chosen more or less at random; yet the diversity of interests represented in the list clearly indicates the extent to which the modern business world is utilizing statistics.

Prominent among individual corporations that have established statistical organizations are the steam railways of the United States. Hardly one of the larger railways but maintains a statistical office of some kind, either in connection with its accounting department or as an entirely separate branch. These statistical offices usually prepare the annual and other periodical reports required by various governmental agencies; many of them compile much additional information for the executives in charge of their operations. Some of the large roads carry this statistical work to a very high

degree of detail and completeness. From these the list shades down to roads which have no statistical force at all, so called, yet are compelled by force of law or circumstances to do a certain amount of statistical work.

A third type of private organization engaged in compiling business statistics consists of the group established primarily for the purpose of collecting and distributing, in digested form, the fundamental statistics of the business or financial world. I refer to the statistical or economic services that prepare statistical charts, barometric diagrams, and the like, for the information of their clients, who are usually business men with a keen interest in industrial possibilities. Business men who subscribe to these services are often of the class who can not afford to maintain a separate statistical organization, or even to keep a statistician on whole or part time, but who can afford to pay a reasonable annual fee for such material as is prepared by the services.

One organization of this type has been doing business since 1902, and another since 1906, although the larger development of this kind of service has been comparatively recent. If I understand the underlying principle of this class of services aright, it is that business conditions move in cycles; that these cycles are not of uniform length or duration; yet that there are certain positive signs of the progressive development of each cycle, which can be observed only by means of a careful charting of the business and financial situation; that by accurate reading of these signs warning can be given of coming events—whether good or bad.

Perhaps a brief description of the kind of work done by organizations of this kind will give the clearest impression of their nature, and the significance of their statistical work. One service publishes periodical reports designed to “give merchants, bankers, and investors carefully collected and condensed facts about business and finance.” Among these reports are a so-called “weekly barometer letter,” analyzing and forecasting fundamental probabilities in business, and indicating the position of business and finance in the current cycle; a monthly desk sheet, giving basic statistics as to new building, bank clearings, railway operations, crops, etc., de-

signed to indicate the fundamental condition of American business; a periodical report on mercantile and commodity price conditions.

Another service, using practically its own words to describe its activities, brings together, in a barometer chart, composite cycles indicating the actual condition of business and finance and forming a basis for forecasting any impending change; serves as a clearing house for a great mass of statistical data, some of which is fundamental and some only of record significance, but all of which can be and is applied to solve the problems of business men, bankers, private investors, and the like; compiles and analyzes special statistics for separate industries.

Still another service is called an "investors' service," which supplies to clients a number of periodical statistical statements on financial conditions, investments, general business, railways and industrial corporations, and the like. This service also issues a monthly business barometer, based on the belief that "all things move more or less in cycles, and to understand these cycles involves a continuous study and analysis of fundamental business conditions."

I have devoted what may seem like a disproportionate amount of attention to the work of these statistical services or clearing houses, not because I am in any way interested in their welfare, but because they seem to be making an effort, at least, to live up to the Westergaard motto with which we opened this paper. In other words, they are taking a great mass of statistical material already available, gathered by other persons or organizations, and are endeavoring to master and digest it, so as to be of the greatest service to the greatest number. The work of all organizations of this sort is still necessarily somewhat in the pioneer stage. Part of their future development will doubtless come from the internal growth and improvement of the organizations themselves, and part from a greater willingness of industrial concerns to furnish figures long regarded as trade secrets. However it may come, development of work of this kind appeals to me as being distinctly along the line of making business statistics really serviceable to society.

In addition to services of the kind I have described, there are many organizations and individuals engaged in the same sort of work, although on a smaller scale. Some men hold themselves out as expert compilers or statisticians, consulting statistical experts, and the like. In much of this work there is unquestionably room for improvement; but there is definite promise for the future in the development of all organizations designed to make statistics serviceable to the business world.

UTILIZATION OF STATISTICS.

We come now to the second branch of our inquiry. The first dealt with the growth of organizations for the compilation of business statistics. The second will be devoted to the use actually made of the statistics when compiled.

It is clear, almost without reflection, that a business man or corporation will use statistics to guide him in his business decisions; to tell him when to expand his activities and when to contract them; to inform him in what sections to look for the safest and quickest results from a sales campaign; to help him decide as to the advisability of a particular proposition; in fact, to guide him daily in the various decisions that are constantly calling for attention.

Further reflection will make the possibilities along these lines stand out even more definitely. Suppose we illustrate these possibilities by a few concrete examples from the business world of today. Take for example, corporations maintaining a national chain of stores, such as the United Cigar Stores, the F. W. Woolworth Company, or any other of similar nature. It is clear that these corporations must keep in close touch with statistics of supply and especially of demand, both by means of reports secured direct from their constituent stores and by observation of general market and purchasing conditions. Going a step further, the newly organized American International Corporation must now have, or must certainly establish, a statistical organization covering not only the situation in the United States but also the whole civilized world as well. Again, every bank and banking house must keep in touch with business and financial conditions and possibilities by statistical means. Whether banks maintain a statistical

department or not, they are increasingly forced to keep track of the future by means of statistics.

Similarly, all business and mercantile houses keep an eye to the future by watching the business barometer for their particular line of activity. A certain hardware manufacturing corporation of the middle west, for example, compiles statistics of crop and farm conditions, as a clue to the purchasing power of the agricultural districts. Trade statistics, banking and financial statistics, agricultural statistics, and the like are all a part of the equipment of modern business houses.

Perhaps the greatest development of the utilization of business statistics on a large scale is in the railway industry. One reason for this is the immensity of the industry, and the complexity of its functions. Another is the character of the railway organization, the necessity of its activities being spread over a wide area, and the difficulty of keeping in touch with all parts of the system without detailed statistical reports. Although the manager of a large industrial plant keeps in daily personal contact with his departmental and division chiefs, a railway general manager has his territory spread over thousands of square miles of area, and can keep in touch with his plant only by a system of daily reports. Hence arises the detailed reporting methods in vogue on all railway systems, whereby the executives receive daily statistical reports from their subordinates, covering all features of current operations.

A friend of mine tells with amusement of his conversation with a railway official. The official, in describing the work done by the various men in his organization, said the division superintendent's duties consisted in reporting to the general superintendent, the duty of the general superintendent was to report to the general manager, the general manager reported to the vice-president in charge of operations, and the vice-president reported to the president. "And to whom does the president report," asked my friend. "He reports to the board of directors," was the reply. On the face of it, these railway officials expended the whole of their energies merely preparing and presenting reports to their chiefs next in command. As a matter of fact, the incident has significance in showing how thoroughly the system of accurate records is

woven into the warp and woof of the railway business, and to a considerable extent of other industrial activity. No official could make an intelligent report to his superior were he not himself conversant with every phase of his work; and if his own work is going wrong at any point, he is not likely to turn in a report until the matter is rectified. In other words, the necessity of reporting daily the status of your work keeps you alert at all times regarding its progress and its effectiveness

SUMMARY

We have seen to how great an extent has developed the practice, on the part of industrial and financial organizations, of establishing statistical offices with the primary object of compiling business statistics of utility in their work. We have seen, further, that these statistics are put to use in numerous ways, but chiefly as guideposts along the path of industrial development and progress. These guideposts may serve as warnings in time of impending stress and storm, or as incentives to development during periods of expansion and optimism. We have noted the fact that the more complex the industry, the more serviceable is a system of statistics detailing its activities. Especially is this true of the railway industry, with its operations spread out over so vast an area.

Much the greater part of this statistical development has gone on during the past ten years. No one who has been working in the field of business statistics during recent years can fail to have been impressed by the tremendous growth in the use of statistics in the industrial world. The statistical services I have described date back hardly more than ten years; they have come into being as the result of a definite need that has only recently been asserting itself.

Take one phase of statistical growth in the railway world. The use of statistics in a wage arbitration was hardly thought of ten years ago. In 1910, in a case involving the switchmen of a group of railways, the employees put on the stand an expert statistician armed with a considerable array of statistical exhibits. From that time, the use of statistics in railway wage arbitrations has grown to tremendous proportions, costing hundreds of thousands of dollars in a single arbitra-

tion, and running the whole gamut of possible subjects. I do not unqualifiedly endorse this particular form of growth in statistical activity, much of which I consider wasteful and useless, but am merely recording it here as a matter of historical development. My emphasis is on the recent and consistent growth of this kind of statistical work. Again, the use of statistics and statistical exhibits in railway rate cases has been greatly developed during the past six or eight years.

To say that industrial complexity will increase with the future development of economic activity is to point out, in another way, the growing need of the future for accurate systems of statistical records and compilations. Along what lines the development will proceed is beyond the scope of the present discussion to conjecture; suffice it that the development must be steady and effective if it is to measure up to the growing need for accurate information. And herein lies the mission of the statistician of today and the near future: So to develop the statistical methods and results of the present that they may meet the increasingly complex needs of future industry. We must especially train ourselves, as students of business problems, to master and digest the material made increasingly available to us, that we may make it of the greatest utility to the business world of the morrow.